WHAT IS CLAIMED IS:

1. A video encoding method of performing motion compensation predictive inter-frame encoding of a to-be-encoded frame by referring to a plurality of reference frames for each macroblock, comprising:

generating a plurality of macroblocks from the plurality of reference frames;

selecting, as a predictive macroblock, one of macroblocks obtained by one of a linear interpolation prediction and a linear extrapolation prediction using one of the plurality of reference macroblocks, an average value of the plurality of reference macroblocks, or the plurality of reference macroblocks; and

encoding a predictive error signal between the selected predictive macroblock and a to-be-encoded macroblock, prediction mode information, and a motion vector.

2. A video encoding method according to claim 1, wherein the plurality of reference frames comprise frames encoded immediately before the to-be-encoded frame, and in the linear extrapolation prediction, the predictive macroblock is generated by subtracting, from a signal obtained by doubling an amplitude of a reference macroblock signal generated from the reference frame, a reference macroblock signal generated from a reference frame preceding frame from

the reference frame.

3.   A video encoding method according to claim 1, wherein the motion vector comprises a motion vector associated with a specific reference frame of the
5   plurality of reference frames.

4.   A video encoding method according to claim 3, wherein the motion vector associated with the specific reference frame comprises a motion vector normalized in accordance with an inter-frame distance between the
10   reference frame and the to-be-encoded frame.

5.   A video encoding method according to claim 1, wherein the motion vector comprises a first motion vector associated with a specific reference frame of the plurality of reference frames and a plurality of
15   motion vectors for a plurality of other reference frames, and the plurality of motion vectors are encoded as differential vectors between the plurality of motion vectors and a motion vector obtained by scaling the first motion vector in accordance with inter-frame
20   distances between the to-be-encoded frame and the plurality of reference frames.

6.   A video encoding method according to any one of claims 1, wherein the prediction mode information includes a first flag indicating one of a single
25   prediction using specific reference frame and a composite prediction using a plurality of reference frames and a second flag indicating whether the

composite prediction is one of a prediction based on an average value of a plurality of reference macroblocks, one of the linear extrapolation prediction and the linear interpolation prediction, the second flag being

5   contained in header data of the to-be-encoded frame and header data for a plurality of to-be-encoded frames.

7.   A video decoding method of decoding motion compensation predictive inter-frame encoded data by referring to a plurality of reference frames for each

10   macroblock, comprising:

receiving encoded motion vector data, encoded prediction mode information, and an encoded predictive error signal;

selecting, in accordance with the motion vector

15   data and the prediction mode information, one from   (a) generation of a predictive macroblock from a specific reference frame of the plurality of reference frames, (b) generation of a plurality of macroblocks from the plurality of reference frames to generate an average

20   value of the plurality of reference frames as a predictive macroblock and (c) generation of a predictive macroblock by a linear extrapolation prediction or linear interpolation prediction; and

generating a decoded frame by adding the generated

25   predictive macroblock and the predictive error signal.

8.   A video decoding method according to claim 7, wherein the plurality of reference frames comprise

frames encoded immediately before a to-be-encoded
frame, and in the linear extrapolation prediction, the
predictive macroblock is generated by subtracting, from
a signal obtained by doubling an amplitude of a
reference macroblock signal generated from an
immediately preceding reference frame, a reference
macroblock signal generated from a reference frame
preceding two frames from the to-be-encoded frame.

9. A video decoding method according to claim 7,
wherein the received motion vector data comprises a
motion vector associated with the specific reference
frame of the plurality of reference frames, and motion
vectors for other reference frames are generated by
scaling/converting the motion vector data in accordance
with inter-frame distances between a to-be-decoded
frame and reference frames.

10. A video decoding method according to claim 9,
wherein the motion vector associated with the specific
reference frame comprises a motion vector normalized in
accordance with an inter-frame distance between the
reference frame and a frame to be encoded.

11. A video decoding method according to claim 7,
wherein the received motion vector data comprises a
motion vector associated with the specific reference
frame and a differential vector associated with another
reference frame, and a motion vector associated with a
reference frame other than the specific reference frame

is generated by scaling/converting the motion vector in accordance with an inter-frame distance between a to-be-decoded frame and the reference frame and adding the converted motion vector obtained by

5   scaling/conversion to the differential vector.

12.   A video decoding method according to any one claims 7, wherein the received prediction mode information includes a first flag indicating a single prediction using the specific reference frame or a

10   composite prediction using a plurality of reference frames and a second flag indicating whether the composite prediction is one of a prediction based on an average value of a plurality of reference macroblocks, the linear extrapolation prediction and the linear

15   interpolation prediction, the second flag being received as one of header data of an encoded frame and part of header data of a plurality of encoded frames.

13.   A video encoding method of performing motion compensation predictive inter-frame encoding of a

20   to-be-encoded frame by referring to a plurality of reference frames for each macroblock, comprising:

generating a predictive macroblock by a linear prediction using the plurality of reference frames;

encoding a predictive error signal between the

25   predictive macroblock and a to-be-encoded macroblock and a motion vector for each macroblock; and

encoding a combination of predictive coefficients

for the linear prediction for each frame.

14. A video encoding method according to claim 13, wherein the plurality of reference frames comprise past frames with respect to the to-be-encoded frame.

5   15. A video decoding method of decoding motion compensation predictive inter-frame encoded data by referring to a plurality of reference frames for each macroblock, comprising:

receiving motion vector data and a propriety error
10   signal encoded for each macroblock and a combination of predictive coefficients encoded for each frame;

generating a predictive macroblock from the plurality of reference frames in accordance with the motion vector and the predictive coefficients; and

15   generating a decoded frame by adding the generated predictive macroblock and the predictive error signal.

16. A video decoding method according to claim 15, wherein the plurality of reference frames comprise past frames with respect to a to-be-encoded frame.

20   17. A video encoding apparatus which subjects a to-be-encoded frame to motion compensation predictive inter-frame encoding by referring to a plurality of reference frames for each macroblock, comprising:

a generator which generates a plurality of
25   macroblocks from the plurality of reference frames;

a selector which selects, as a predictive macroblock, one of macroblocks obtained by one of a

linear interpolation prediction and a linear
extrapolation prediction using one of the plurality of
reference macroblocks, an average value of the
plurality of reference macroblocks, or the plurality of
5 reference macroblocks; and

an encoder which encodes a predictive error signal
between the selected predictive macroblock and a
to-be-encoded macroblock, prediction mode information,
and a motion vector.

10 18. A video decoding apparatus for decoding motion
compensation predictive inter-frame encoded data by
referring to a plurality of reference frames for each
macroblock, comprising:

a receiving unit configured to receive encoded
15 motion vector data, encoded prediction mode
information, and encoded predictive error signal;

a selector which selects, in accordance with the
motion vector data and the prediction mode information,
one from (a) generation of a predictive macroblock from
20 a specific reference frame of the plurality of
reference frames, (b) generation of a plurality of
macroblocks from the plurality of reference frames to
generate an average value of the plurality of reference
frames as a predictive macroblock and (c) generation of
25 a predictive macroblock by a linear extrapolation
prediction or linear interpolation prediction; and

an adder which adds the generated predictive

macroblock and the predictive error signal.

19. A video encoding apparatus for performing motion compensation predictive inter-frame encoding of a to-be-encoded frame by referring to a plurality of reference frames for each macroblock, comprising:

a generator which generates a predictive macroblock by a linear prediction using the plurality of reference frames;

an encoder which encodes a predictive error signal between the predictive macroblock and a to-be-encoded macroblock and a motion vector for each macroblock; and

an encoder which encodes a combination of predictive coefficients for the linear prediction for each frame.

20. A video decoding apparatus which decodes motion compensation predictive inter-frame encoded data by referring to a plurality of reference frames for each macroblock, comprising:

a receiving unit configured to receives motion vector data and a propriety error signal encoded for each macroblock and a combination of predictive coefficients encoded for each frame;

a generator which generates a predictive macroblock from the plurality of reference frames in accordance with the motion vector and the predictive coefficients; and

an adder which adds the generated predictive

macroblock and the predictive error signal.

21. A program stored in a computer readable medium for causing a computer to execute motion compensation predictive inter-frame encoding processing by referring to a plurality of video frames for each macroblock, the program including:

means for instructing the computer to generate a plurality of macroblocks from the plurality of reference frames;

means for instructing the computer to select, as a predictive macroblock, one of macroblocks obtained by a linear interpolation prediction or a linear extrapolation prediction using one of the plurality of reference macroblocks, an average value of the plurality of reference macroblocks, or the plurality of reference macroblocks; and

means for instructing the computer to encode a predictive error signal between the selected predictive macroblock and a to-be-encoded macroblock, prediction mode information, and a motion vector.

22. A program stored in a computer readable medium for causing a computer to execute motion compensation predictive inter-frame decoding processing by referring to a plurality of video frames for each macroblock, the program including:

means for instructing the computer to receive encoded motion vector data, encoded prediction mode

information, and encoded predictive error signal;

means for instructing the computer to select, in accordance with the motion vector data and the prediction mode information, one from (a) generation of a predictive macroblock from specific reference frame of the plurality of reference frames, (b) generation of a plurality of macroblocks from the plurality of reference frames so as to generate an average value of the plurality of reference frames as a predictive macroblock and (c) generation of a predictive macroblock by a linear extrapolation prediction or linear interpolation prediction, and

means for instructing the computer to add the generated predictive macroblock and the predictive error signal.

23. A program stored in a computer readable medium for causing a computer to execute motion compensation predictive inter-frame encoding processing by referring to a plurality of reference frames for each macroblock, the program including:

means for instructing the computer to generate a predictive macroblock by a linear prediction using the plurality of reference frames;

means for instructing the computer to encode a predictive error signal between the predictive macroblock and a to-be-encoded macroblock and a motion vector for each macroblock, and

means for instructing the computer to encode a combination of predictive coefficients for the linear prediction for each frame.

24. A program stored in a computer readable medium for causing a computer to execute motion compensation predictive inter-frame decoding processing by referring to a plurality of video frames for each macroblock, the program including:

means for instructing the computer to receive motion vector data and a propriety error signal encoded for each macroblock and a combination of predictive coefficients encoded for each frame,

means for instructing the computer to generate a predictive macroblock from the plurality of reference frames in accordance with the motion vector and the predictive coefficients, and

means for instructing the computer to add the generated predictive macroblock and the predictive error signal.

25. A video encoding method of performing motion compensation predictive inter-frame encoding of each to-be-encoded block contained in a to-be-encoded frame of an input video by using at least one reference frame, comprising:

selecting, for each to-be-encoded block, one of a first mode of generating a predictive block signal from a single reference frame and a second mode of

generating the predictive block signal by a linear sum of a plurality of reference blocks extracted from a plurality of reference frames;

encoding a differential signal between the
5   selected predictive block signal and a signal of the to-be-encoded block;

selecting, for each set of a plurality of pixel blocks in the to-be-encoded frame and for each to-be-encoded frame, one of an average value prediction
10 based on the plurality of reference blocks and a linear interpolation prediction based on the plurality of reference frames and a display time of the to-be-encoded frame, for the linear sum prediction;

encoding, for the each to-be-encoded block or each
15 set of a plurality of to-be-encoded blocks, first encoding mode information indicating that a specific one of the first and second predictive block generating modes is selected at the time of generation of the predictive block signal; and

20 encoding, for each set of a plurality of pixel blocks of the to-be-encoded frame or for each to-be-encoded frame, second encoding mode information indicating that a specific one of the average value prediction and the linear interpolation prediction is
25 selected as the linear sum prediction.

26. A video decoding method of performing motion compensation predictive inter-frame decoding of each

to-be-decoded block contained in a to-be-decoded frame
of a video picture by using at least one reference
frame, comprising:

decoding a predictive error signal for a signal of

5   the to-be-decoded block corresponding to a predictive
block signal;

decoding, for the each to-be-decoded block or for
each set of a plurality of to-be-decoded blocks, first
encoding mode information indicating which one of a

10   first predictive block generating mode of generating a
predictive block signal from a single reference frame
and a second predictive block generating mode of
generating the predictive block signal by a linear sum
prediction based on a plurality of reference blocks

15   extracted from a plurality of reference frames is
selected at the time of generation of a predictive
block signal on an encoding side;

decoding, for each set of a plurality of pixel
blocks of the to-be-decoded frame or for each

20   to-be-decoded frame, second encoding mode information
indicating which one of an average value prediction
based on the plurality of reference blocks and a linear
interpolation prediction based on the plurality of
reference frames and a display time of the

25   to-be-encoded frame is selected as the linear sum
prediction;

generating the predictive block in accordance with

the decoded first encoding mode information and the
decoded second encoding mode information; and

generating a reconstructed video signal by using
the generated predictive block signal and the decoded
5   predictive error signal.